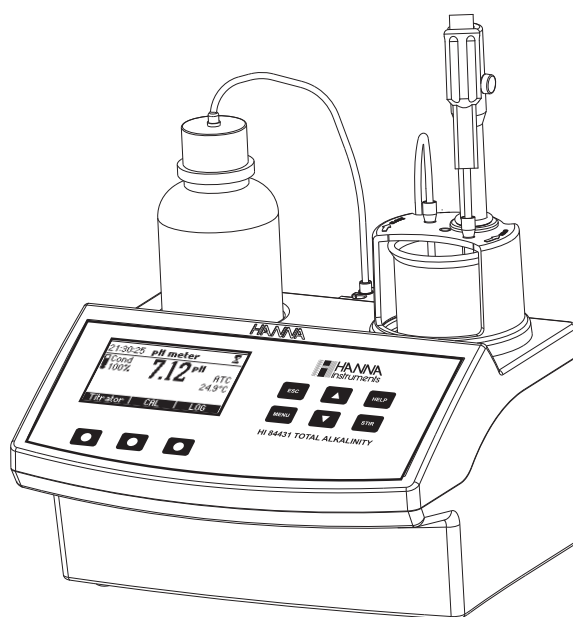


## Instruction Manual

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# HI 84431 TOTAL ALKALINITY MINITRATOR & pH METER for Water Analysis



Dear Customer,

Thank you for choosing a Hanna product. This manual will provide you with the necessary information for the correct use of the instrument. Please read it carefully before using the meter. If you need additional technical information, do not hesitate to e-mail us at [tech@hannainst.com](mailto:tech@hannainst.com).

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## PRELIMINARY EXAMINATION

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Please examine this product carefully. Make sure that the instrument is not damaged. If any damage occurred during shipment, please notify your Dealer.

Each **HI 84431** minititrator is supplied complete with:

- **HI 1131B** pH electrode
- **HI 7662-M** Temperature probe
- **HI 84431-50** Titrant low range (100 mL)
- **HI 84431-51** Titrant high range (100 mL)
- **HI 84431-55** Pump calibration solution (100 mL)
- **HI 70004** pH 4.01 buffer solution (2 x 20 mL)
- **HI 700083** pH 8.30 buffer solution (2 x 20 mL)
- **HI 70010** pH 10.01 buffer solution (2 x 20 mL)
- Two 100 mL beakers
- Tube set with dispensing tip
- Stir bars (medium 2 pcs.)
- 12 Vdc power adapter
- Instruction manual

**Note:** Save all packing material until you are sure that the instrument works correctly. Any defective item must be returned in its original packing.

## GENERAL DESCRIPTION

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The **HI 84431** is an easy to use microprocessor-based automatic minititrator and pH meter designed for the rapid and accurate analysis of Total Titratable alkalinity in water. By eliminating subjective factors including color indicators, errors in mathematical calculations or erratic titrant additions from the measurement, the **HI 84431** makes Total Titratable alkalinity analysis precisely. This will quickly become a valuable alkalinity analysis tool of waters and wastewaters.

The instrument benefits from Hanna's many years of experience as manufacturer of quality analytical instruments. A clear and well-designed user interface makes the instrument intuitive and simple to use. A dedicated **HELP** key aids in set-up, calibration, status and troubleshooting.

By simply pressing **START** key, the **HI 84431** automatically starts pump operation and titrates the sample to the end point. The **HI 84431** has a simple and accurate peristaltic pump to ensure the best accuracy and repeatability. By performing pump calibration with the Hanna standard provided, the instrument accuracy is assured.

The instrument employs a powerful and effective built-in algorithm to analyze the pH response to determine the exact pH endpoint, then uses this to make the necessary calculations. The Titratable Alkalinity determination is instantaneously displayed in selected measurement units on the large dot matrix display. The instrument is ready for the next analysis immediately.

Other features:

- Log on demand up to 100 samples (50 for pH measurement; 50 for titration results)
- GLP feature, to view last calibration data for pH electrode and pump

### **MEASUREMENT SIGNIFICANCE**

Water alkalinity is expression of a waters acid-neutralizing capacity and it is determined by titration with standard acid solutions.

Alkalinity is an important parameter for control and treatment of potable and wastewaters, because it indicates the water buffering capacity (ability to resist at pH change, primarily because of bicarbonate/ carbonate content). A low water alkalinity signifies that the water is susceptible to pH change and high alkalinity indicates that water is able to resist a major change of pH. Alkalinity can be used to estimate water hardness or to determine water corrosive capacity.

Alkalinity of surface water, quantified by mg/L as  $\text{CaCO}_3$  or meq/L, may be caused by carbonate, bicarbonate, hydroxide, phosphates, borates, silicates or organic acids salts.

Conventionally, the water alkalinity is approximated as sum of components. Three types of alkalinities exist together to form total alkalinity:

$$\text{TA} = \text{OH}^- + \text{CO}_3^{2-} + \text{HCO}_3^-$$

$\text{OH}^-$  — hydroxide alkalinity

$\text{CO}_3^{2-}$  — carbonate alkalinity

$\text{HCO}_3^-$  — bicarbonate alkalinity

TA — total alkalinity

Different tests can be performed to determine the quantity of different alkalinities present. A titration to pH 8.3 is considered Strong Alkalinity (SA) and to pH 4.5 Total Alkalinity (TA).

The results of a titration provide a means to classify the principle forms of alkalinity.

Relationship of titrant volumes for alkalinity calculations:

| Titration results | Hydroxide | Carbonate | Bicarbonate |
|-------------------|-----------|-----------|-------------|
| SA=0              | 0         | 0         | TA          |
| SA=TA             | TA        | 0         | 0           |
| SA < 1/2TA        | 0         | 2SA       | TA-2SA      |
| SA = 1/2TA        | 0         | TA        | 0           |
| SA > 1/2TA        | 2SA-TA    | 2(TA-SA)  | 0           |

According to the Standard Methods of Waters and Wastewaters Analysis, there are two options to determine water alkalinity:

- 1) Strong alkalinity determination by titration of the water sample with strong acid solution to 8.3 pH (known as phenolphthalein alkalinity).
- 2) Total alkalinity determination by titration of the water sample with strong acid solution to 4.5 pH (known as bromcresol green alkalinity).

Potentiometric end point detection using a pH electrode is more objective than using visual end point determinations with color changing indicators. The **HI 84431** minititrator is a potentiometric titrator. The instrument also can be used as a pH meter. The volume of titrant dispensed necessary to reach the end point is then used to calculate the water alkalinity expressed in mg/L as  $\text{CaCO}_3$  meq/L as  $\text{CaCO}_3$ .

Interferences:

- dissolved gases, lost or gained during samples storage or transport can modify the alkalinity of the samples;
- presence in the samples of the: precipitates, solid suspensions, oils, soaps can coat a pH electrode;

To eliminate or diminish the interference effects, it is recommended:

- to protect the samples against the atmospheric action (store in an airtight vessel);
- to avoid vigorous shaking or mixing: stir gently;
- maintenance of the pH electrode (see section Electrode Conditioning and Maintenance)

## SPECIFICATIONS

|                   |  |   |
|-------------------|--|---|
| Titrator          | Range  | Titratable alkalinity (low range)<br>mg/L : 15.0 - 500.0 mg/L as CaCO <sub>3</sub><br>meq/L : 0.3 - 10.0 meq/L as CaCO <sub>3</sub><br>Titratable alkalinity (high range)<br>mg/L : 400 - 4000 mg/L as CaCO <sub>3</sub><br>meq/L : 8 - 80 meq/L as CaCO <sub>3</sub> |
|                   | Resolution   | Titratable alkalinity (low range):<br>0.1 mg/L<br>0.1 meq/L<br>Titratable alkalinity (high range):<br>1mg/L<br>1meq/L   |
|                   | Accuracy   | 5% of reading   |
|                   | Titration method                                     | Acid-base titration (total alkalinity / strong alkalinity)  |
|                   | Principle  | End point titration: 4.50 pH / 8.30 pH  |
|                   | Pump debit   | 0.5 mL/min  |
|                   | Stirring speed                                       | 600 rpm   |
|                   | Log data   | Up to 50 samples  |
|                   | pH meter   | -2.0 to 16.0 pH / -2.00 to 16.00 pH   |
|                   | pH Resolution:                                       | 0.1 pH / 0.01 pH  |
|                   | pH Accuracy:   | ± 0.01 pH   |
|                   | pH Calibration:                                      | 1, 2 or 3 calibration points;<br>3 available buffers (4.01; 8.30; 10.01)  |
|                   | Temperature compensation:                            | manual or automatic from<br>-20 to 120 °C (-4 to 248 °F)  |
|                   | Log data   | Up to 50 samples  |
| Temperature       | Range  | -20.0 to 120.0 °C (-4.0 to 248.0 °F)  |
|                   | Resolution   | 0.1 °C  |
|                   | Accuracy   | ±0.4 °C without probe error   |
| Electrode         | <b>HI 1131B</b> (included)                           |   |
| Temperature Probe | <b>HI 7662-M</b> (included)                          |   |
| Environment       | 0 to 50 °C (32 to 122 °F); max 95% RH non-condensing |   |
| Power supply      | 12 Vdc power adapter                                 |   |
| Dimensions        | 208 × 214 × 163 mm (8.2×8.4×6.4") (with beaker)      |   |
| Weight            | 2200 g (77 oz.)                                      |   |

#### REQUIRED REAGENTS

| <u>Code</u>   | <u>Description</u>        | <u>Quantity/Test</u>                       |
|---------------|---------------------------|--|
| HI 84431 - 50 | Titrant (Low Range)       | 1 mL                                       |
| HI 84431 - 51 | Titrant (High Range)      | 1 mL                                       |
| HI 84431 - 55 | Pump Calibration Solution | 2 mL for low range<br>20 mL for high range |

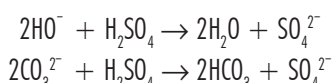
#### PRINCIPLE OF OPERATION

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Water alkalinity determination is performed by titration with acid reagent to pH end point.

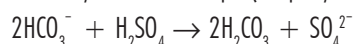
Alkalinity is expressed as:

- Strong alkalinity (phenolphthalein alkalinity) determination by titration at 8.3 pH (in this reaction hydroxide ions are converted to water and carbonate ions to bicarbonate ions):



Since bicarbonate ions can be converted to carbonic acid with additional sulfuric acid, the phenolphthalein alkalinity measure total hydroxide ions and one half of the bicarbonate ions contribution.

- Total alkalinity determination by titration at 4.5 pH (completely convert of the bicarbonate ions):



It is important that the samples are protected against atmospheric factors (store them in sealed bottles that are completely filled) and avoid vigorous shaking, mixing and long exposure to air.

The **HI 84431** minititrator is designed to determine the alkalinity of waters by potentiometric titration in a low range (10-500mg/mL as  $\text{CaCO}_3$ ) and in a high range (400-4000mg/mL as  $\text{CaCO}_3$ ). Selection of the alkalinity range is limited by the pH sample: if the measured pH is greater than 8.3 both total and strong alkalinity can be determined. If the sample pH is lower than 8.3 only total alkalinity can be determined.

The **HI 84431** utilizes two different titration solutions to cover the entire measurement range. If the range is changed, the titrant must be changed and the peristaltic pump must be primed and recalibrated.

**HI 84431-55** is used for pump calibration; the volume used will vary for the selected range.

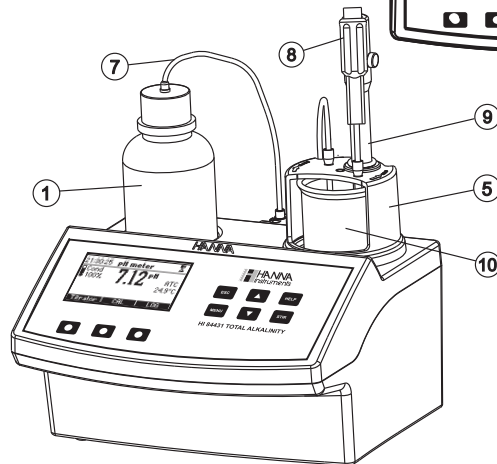
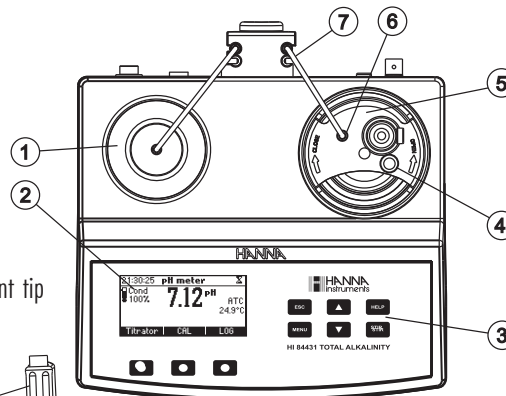
Titrateable Alkalinity in waters, as performed on the **HI 84431** minititrator, utilizes a simple sample preparation, a high quality peristaltic dosing pump for titrant, potentiometric endpoint detector and instantaneous computations. To maintain the high precision of the titrator, a simple pump calibration procedure is required. The calibration involves the analysis of a known volume of a known solution (standard provided) and compensates for changes in pump dosing that may occur due to many factors including tube stretching or aging. This procedure should be performed regularly.



## FUNCTIONAL AND PHYSICAL DESCRIPTION

### OVERHEAD VIEW

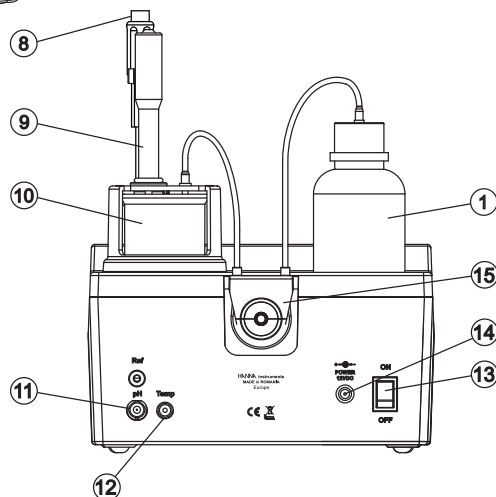
1. Titrant bottle
2. Graphic LCD
3. Keypad
4. Dedicated guide tube for Temperature Probe
5. Electrode holder
6. Dedicated guide tube for titrant tip
7. Peristaltic pump tube



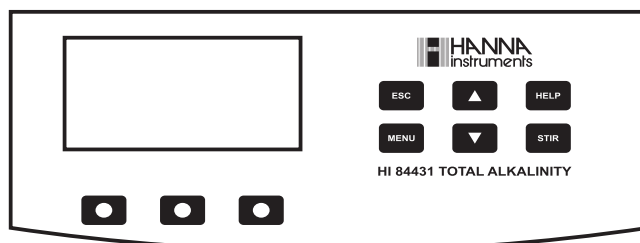
FRONT VIEW

### REAR VIEW

8. Temperature probe
9. pH Electrode
10. Beaker
11. BNC electrode connector
12. Temperature probe socket
13. Power switch
14. Power adapter connector
15. Peristaltic pump



## KEYPAD FUNCTION AND INDICATORS



- ESC** - used to leave the current screen and to return either to the previous screen or to the main screen. When pressed while modifying a parameter within the **SETUP** menu, exits parameter without changing it.
- ▼/▲** - used to modify the parameters' values, to scroll the information displayed while viewing a help or to move between the options from the instrument's **SETUP**
- HELP** - used to access/leave the instrument's contextual help
- MENU** - used to enter **SETUP**, **Recall** or **GLP** selection menu, while instrument is in **pH** or **Titration** main screen
- STIR** - used to start/stop the stirrer.

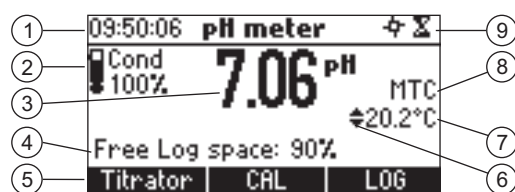
**Note:** The stirrer starts automatically during pump calibration and titration and cannot be stopped by pressing **STIR** key.

## GUIDE TO INDICATORS

During the instrument's operation information is displayed on the LCD.

Displayed icons:

|   |                   |   |                           |
|---|-------------------|---|---------------------------|
|  | Unstable reading. |  | Pump running.             |
|  | Stirrer on.       |  | Parameter can be changed. |



1. Current time and instrument mode information (pH meter or Titrator)
2. pH electrode condition information
3. Main reading information
4. Instrument status information
5. Functional key area
6. Indicates that the displayed value can be changed using ARROW keys
7. Temperature value (°C, °F)
8. pH temperature compensation mode (Manual or Automatic)
9. Stirrer and reading status area

## PERISTALTIC PUMP

Peristaltic pumps are self priming. Liquid never contacts the pump components. The titrant tubing is pressed along the rotating rollers of the pump. The rollers compress the tubing, driving the titrant to the dispensing tip.

## TITRATOR STARTUP

---

This is a general outline of the steps required to make a titration. The following sections expand upon each section.

- Place the instrument on a flat table. Do not place the instrument in direct sun light.
- Connect the power adapter to the instrument.
- Turn the instrument ON using the power switch from the rear panel of the instrument.
- Set up the instrument. See the “Setup Configuration Menu” section for details.
- Connect the pH sensor and temperature probe to the instrument.
- Calibrate the pH electrode. At least a single point calibration is necessary for titration.
- Place the peristaltic pump tube on the pump (inlet tube is connected with the reagent bottle, outlet tube is connected with the dosing tip). See the “Pump Tube Replacement” section for the procedure.
- Remove the reagent bottle cap and replace the bottle cap with the tubes. Place the reagent bottle in the appropriate place on the titrator top (pay attention to the titration range).
- Purge the titrant.
- Calibrate the pump.
- Prepare the sample.
- Run a titration and log sample results.

## SETUP CONFIGURATION MENU

The titrator's setup configuration menu may be accessed from the pH or titration screens by pressing the **MENU** key, then **Setup**.

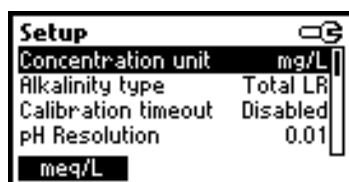
A list of setup parameters will be displayed with currently configured setting.

While in the setup menu it is possible to modify the instrument's operation parameters. The **ARROW** keys permit the user to scroll the setup parameters.

Press **HELP** to view the contextual help.

Press **ESC** to return to the main screen.

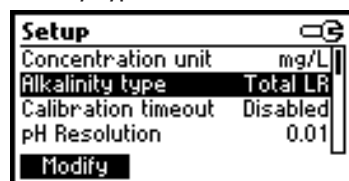
### Concentration unit



Options: mg/L, meq/L.

Press the corresponding function key to change the option.

### Alkalinity type



Options: Total LR (total alkalinity low range)  
Total HR (total alkalinity high range)  
Strong LR (strong alkalinity low range)  
Strong HR (strong alkalinity high range)

Press the corresponding function key to change the option.

From your knowledge of expected concentrations, use the table below to determine which settings and solutions are appropriate:

| Alkalinity Type                          |                       | Total LR    | Total HR    | Strong LR   | Strong HR   |
|--|-----------------------|-------------|-------------|-------------|-------------|
| Measurement range                        | mg/L $\text{CaCO}_3$  | 10-500      | 400-4000    | 10-500      | 400-4000    |
|  | meq/L $\text{CaCO}_3$ | 0.2-10.0    | 8-80        | 0.2-10.0    | 8-80        |
| Pump calibration solution (HI 84431-55M) |                       | 2 mL        | 20 mL       | 2 mL        | 20 mL       |
| Titrant required                         |                       | HI 84431-50 | HI 84431-51 | HI 84431-50 | HI 84431-51 |
| Sample size (mL)                         |                       | 50 mL       | 50 mL       | 50 mL       | 50 mL       |
| Minimum pH of sample                     |                       | >4.5        | >4.5        | >8.3        | >8.3        |
| End point of titration                   |                       | 4.5 pH      | 4.5 pH      | 8.3 pH      | 8.3 pH      |

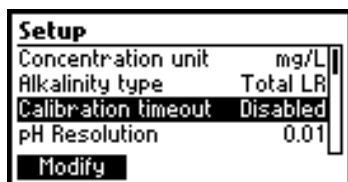
Use Total LR or Strong LR for waters alkalinity in the 10 - 500 mg/L range.

Use Total HR or Strong HR for waters alkalinity in the 400 - 4000 mg/L range.

Use the appropriate titrant for each range.

Also, the pump must be recalibrated when the measurement range is changed (see table above).

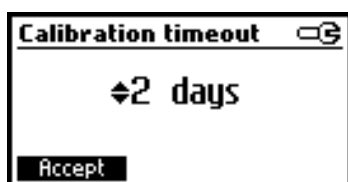
#### Calibration timeout



Options: Disabled or 1 to 7 days.

This option is used to set the number of days before the pH calibration expired warning message is flagged.

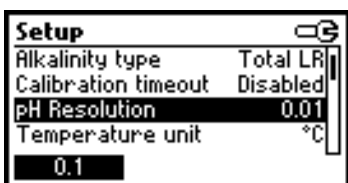
Press **Modify** to access the calibration timeout value modify parameter.



Use the **ARROW** keys in order to increase/decrease the value.

Press **Accept** to confirm or **ESC** to return to the setup menu without saving the new value.

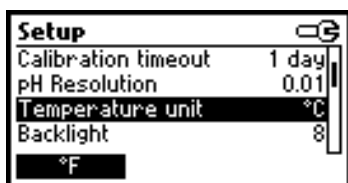
#### pH resolution



Options: 0.1, 0.01.

Press the displayed function key in order to change the pH resolution.

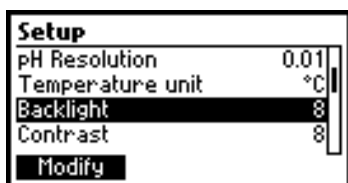
#### Temperature unit



Options: °C, °F.

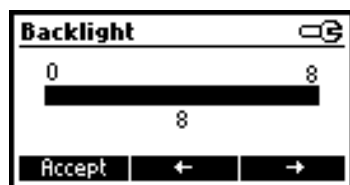
Press the function key in order to change the temperature unit.

#### Backlight



Options: 0 to 8.

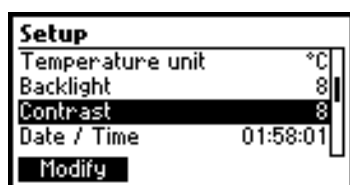
Press **Modify** to access the backlight level.



Use the **ARROW** keys or ← / → in order to increase/decrease the displayed contrast.

Press **Accept** to confirm or **ESC** to return to the setup menu.

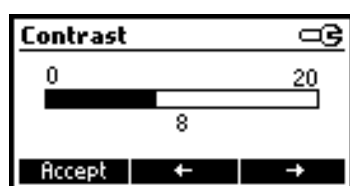
## Contrast



**Option: 0 to 20.**

This option is used to set the display's contrast.

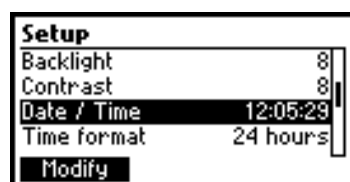
Press **Modify** to change the display's contrast.



Use the **ARROW** keys or ← / → in order to increase/decrease the value.

Press **Accept** to confirm the value or **ESC** to return to the setup menu.

## Date / Time



This option is used to set the instrument's date and time.

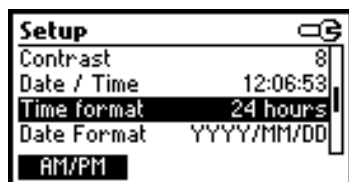
Press **Modify** to change the date/time.



Press ← / → to highlight the value to be modified (year, month, day, hour, minute or second). Use the **ARROW** keys to change the value.

Press **Accept** to confirm the new value or **ESC** to return to the setup.

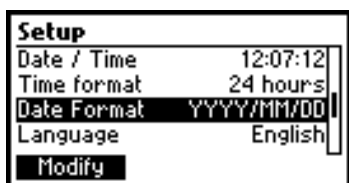
## Time format



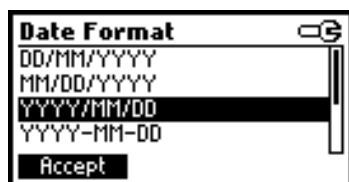
Option: AM/PM or 24 hours.

Press the functional key to select the new value.

## Date format



Press **Modify** to change the Date Format.



Use the **ARROW** keys to select the desired format.

Press **Accept** to confirm the value or **ESC** to return to the setup menu.

## Language

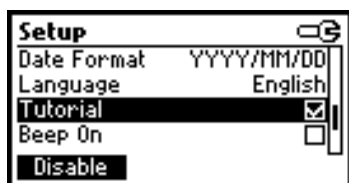


Press the corresponding function key to change the language.

If the new selected language cannot be loaded, the previously selected language will be reloaded.

If no language can be loaded at startup the instrument will work in the "safe mode". In "safe mode" all the messages are displayed in English and tutorial and help information are not available.

## Tutorial



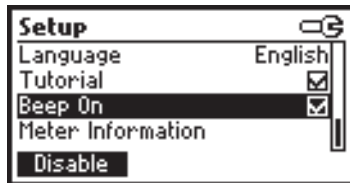
This option is used to enable/disable tutorial mode.

If enabled this option will provide the user short guides on the screen.

Press the function key to select this option.



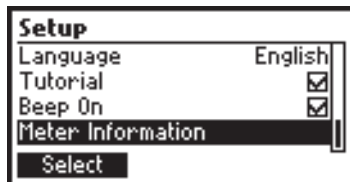
### Beep On



Press the function key to select the new option. When enabled, a short beep is heard every time a key is pressed or when the calibration can be confirmed.

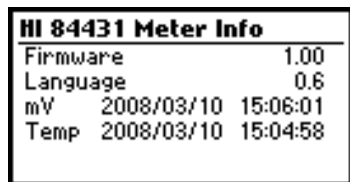
A long beep alert sounds when the pressed key is not active or a wrong condition is detected while in calibration.

### Meter information



Press **Select** to view the firmware version, language version, mV factory calibration date and time and temperature factory calibration date and time.

Press **ESC** to return to the **Setup** mode.



## **ELECTRODE PREPARATION**

---

### **PREPARATION PROCEDURE**

Remove the electrode protective cap.

DO NOT BE ALARMED IF ANY SALT DEPOSITS ARE PRESENT. This is normal with electrodes and they will disappear when rinsed with distilled water.

During transport tiny bubbles of air may have formed inside the glass bulb. The electrode cannot function properly under these conditions. These bubbles can be removed by "shaking down" the electrode as you would do with a glass thermometer.

If the bulb is dry, soak the electrode in **HI 70300** Storage Solution for at least one hour.

## ELECTRODE CALIBRATION PROCEDURE

It is recommended to calibrate the instrument frequently, especially if high accuracy is required. The pH electrode should be recalibrated:

- a) Whenever the pH electrode is replaced
- b) At least once a week
- c) After testing aggressive chemicals and after electrode is cleaned
- d) When high accuracy is required
- e) If the pH calibration expired warning is displayed during measurement. Every time you calibrate the instrument clean the electrode (see the "pH Cleaning Procedure" section) and use fresh buffers.

### PROCEDURE

A single, two or three-points calibration can be performed, using the three predefined buffers 4.01, 8.30 and 10.01 pH. For a single point calibration any of the three buffers may be used, but using 8.30 pH is recommended.

**Note:** The HI 84431 will not accept other pH buffers for calibration.

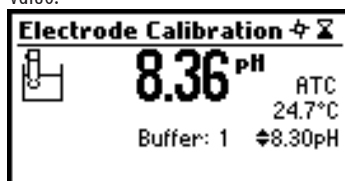
- Pour small quantities of selected buffer solutions into clean beakers. For accurate calibration use two beakers for each buffer solution, the first one for rinsing the electrode and the second one for calibration.
- Put a magnetic stir bar in each beaker with the calibration buffer solution.
- Remove the protective cap and rinse the electrodes with some of the buffer solution to be used for the first calibration point. Open fill hole on electrode.
- Put the first beaker with calibration buffer in the beaker holder.
- Place the electrode holder on the top of the beaker and secure it by turning clockwise.
- Immerse the pH electrode and the temperature probe approximately 2 cm (0.8") into the buffer paying attention not to touch the stir bar.

To select **Electrode calibration** screen follow the next steps:

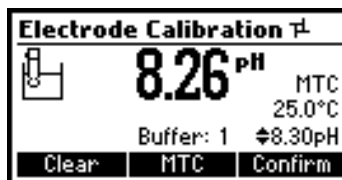
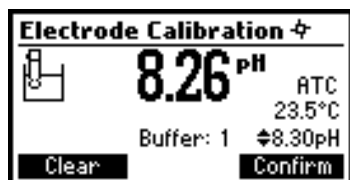
- From **pH meter** screen press **CAL** function key then **Electrode**.
- From **Titration** screen press **CAL** function key then **Electrode**.
- The electrode calibration screen will be displayed.

### Point 1 calibration

- The 8.30 buffer will be selected by default. If necessary press the **ARROW** keys in order to select a different buffer value.



- The  $\Sigma$  (unstable measurement) symbol will be shown on the display until the reading becomes stable.
- When the reading is stable and close to the selected buffer, the  $\Sigma$  (unstable measurement) symbol will disappear and the **Confirm** key will become active.



- Press **Confirm** to confirm the calibration.
- Press **ESC** to exit calibration.

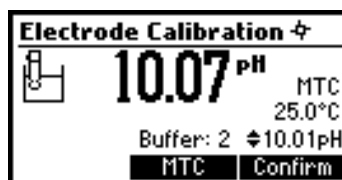
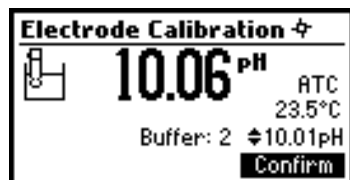
**Notes:**

- To clear a previous calibration and to return to the default value, press **Clear** at any time after entering calibration mode. The “**Calibration cleared**” message will be shown for a few seconds on the display. If **Clear** is invoked during the first calibration point the instrument returns to the measurement mode.

- The **Clear** key is displayed only if a previous calibration exists.

#### Point 2 calibration

- The calibrated value will be shown on the display and the second expected buffer value will be displayed.
- Remove the electrode holder with electrodes from the top of the beaker.
- Place the second buffer into beaker and place in beaker holder. Rinse the electrodes in a beaker containing the second buffer rinsing solution.
- Place the electrode holder (with electrodes) on the top of the beaker, lock cap by turning.
- If necessary press the **ARROW** keys in order to select a different buffer value.
- The  $\Sigma$  (unstable measurement) symbol will be shown on the display until the reading becomes stable.
- When the reading is stable and close to the selected buffer, the  $\Sigma$  (unstable measurement) symbol will disappear and the **Confirm** key will become active.

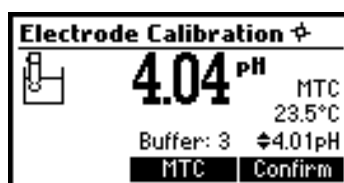
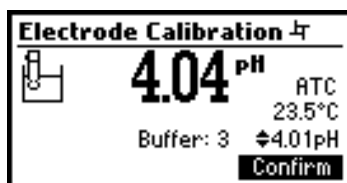


- Press **Confirm** to confirm the calibration.
- The calibrated value will be shown on the display and the third expected buffer value will be automatically selected.

- After the second calibration point has been confirmed, press **ESC** to exit without performing the third calibration point.

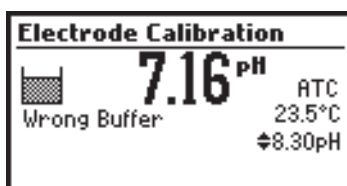
### **Point 3 calibration**

- Remove the electrode holder with electrodes from the top of the beaker.
- Place the third buffer solution in a beaker and place in beaker holder. Rinse the probes in a beaker with third buffer rinsing solution.
- Place the electrode holder (with electrode) in the beaker with third buffer and secure top by locking.
- The **⚡** (unstable measurement) symbol will be shown on the display until the reading becomes stable.
- When the reading is stable and close to the selected buffer, the **⚡** (unstable measurement) symbol will disappear and the **Confirm** key will become active.
- Press **Confirm** to confirm the calibration. The instrument stores the calibration value and

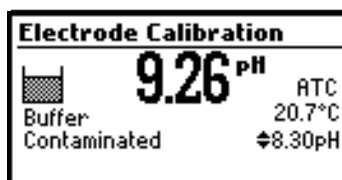
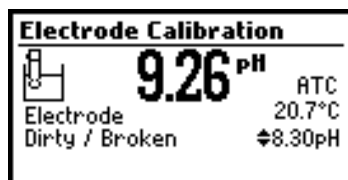


returns to pH meter/titrator calibration menu, where the date and time for the last pH calibration will be updated.

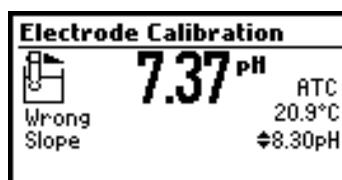
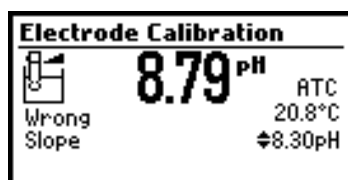
- Notes:**
- A buffer confirmed during the calibration process is removed from the list of calibration buffers available for further calibration points.
  - If the value measured by the instrument is not close to the selected buffer a **“Wrong Buffer”** error message will be shown on the display.  
Check if the correct buffer has been used or regenerate the pH electrodes by following



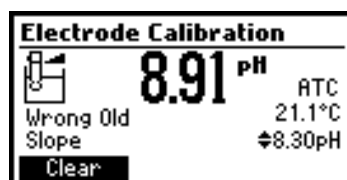
the Cleaning Procedure (see the “pH Cleaning Procedure” section). If necessary change the buffer or the electrode.



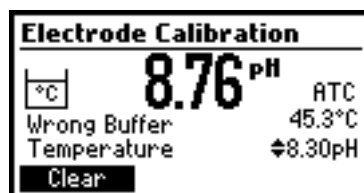
- If the measured offset isn't within the preset limits the meter will display the message "Buffer Contaminated" alternatively with "Electrode Dirty/Broken".
- If the computed slope isn't within the preset limits the meter will display the message "Wrong Slope". If the slope is too high the symbol ▲ will be displayed. If the slope is too low the symbol ▼ will be displayed.



- If the "Wrong Old Slope" error message is displayed, an inconsistency exists between the current and the previous (old) calibration. Clear the calibration parameters by pressing **Clear** and proceed with calibration from the current calibration point. The instrument will keep all the confirmed values during the current calibration point.



- If the temperature reading is out of the defined temperature range of the buffer (0 to 45 °C) the "Wrong Buffer Temperature" error message will be displayed, and the symbol °C will blink on the display. Calibration cannot be confirmed in this situation.



## pH BUFFER TEMPERATURE DEPENDENCE

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The temperature has an effect on pH. The calibration buffer solutions are affected by temperature changes to a lesser degree than normal solutions. During calibration the instrument will automatically calibrate to the pH value corresponding to the measured or set temperature.

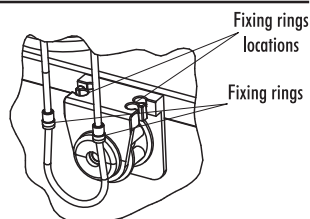
During calibration the instrument will display the pH buffer value at 25 °C.

| TEMP |     | pH BUFFERS |      |       |
|------|-----|------------|------|-------|
| °C   | °F  | 4.01       | 8.30 | 10.01 |
| 0    | 32  | 4.01       | 8.48 | 10.32 |
| 5    | 41  | 4.00       | 8.44 | 10.24 |
| 10   | 50  | 4.00       | 8.41 | 10.18 |
| 15   | 59  | 4.00       | 8.37 | 10.12 |
| 20   | 68  | 4.00       | 8.33 | 10.06 |
| 25   | 77  | 4.01       | 8.30 | 10.01 |
| 30   | 86  | 4.02       | 8.27 | 9.96  |
| 35   | 95  | 4.03       | 8.24 | 9.92  |
| 40   | 104 | 4.04       | 8.21 | 9.88  |

## PUMP TUBE INSTALLATION

To mount the new peristaltic pump tube follow next steps:

- Position one peristaltic pump fixing ring on its location.
- Stretch the tube over the peristaltic pump rolls.
- Fix the second pump fixing ring on its location.
- Determine which titrant is required for the expected alkalinity range selected (see table in Alkalinity Type).
- Attach the tube to the reagent bottle.



**Note:** Purge the peristaltic pump until drops of reagent appears on the dosing tip by pressing the **PURGE** key from the titrator main screen.

To remove the tube of the peristaltic pump follow next steps:

**Caution:** Purge line with water to remove titrant solution from tube.

- Detach the tubes system from the reagent bottle.
- Grasp one fixing ring of the peristaltic pump tube.
- Pull the tube until the fixing rings are taken out from their location.
- Remove the other side of the tube.

## PURGE

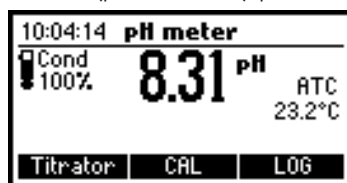
Purging should be performed:

- whenever the tube of the peristaltic pump is replaced;
- whenever the titrant is changed or a new bottle is used;
- before starting a pump calibration;
- before starting a lot of titrations.

In order to start purging press the **Purge** key from the titrator main screen. The purging stops automatically after 5 minutes.

To access the **Purge** key follow the next steps.

- From the instrument main screen (pH meter screen) press "Titrator" function key.

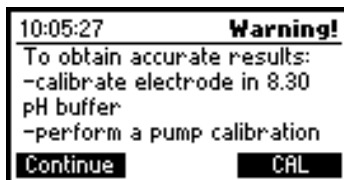


The instrument will display the next screen if any of the following conditions exist:

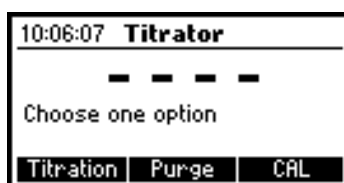
- the meter hasn't been calibrated in 8.30 pH buffer
- the pH calibration has expired



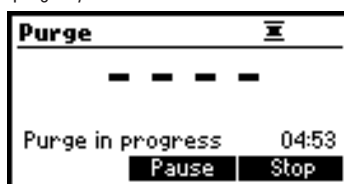
- a pump calibration hasn't been performed or more than 3 days have passed since the last pump calibration.



- Press **CAL** to access the titration calibration menu where electrode and pump calibration may be accessed.
- Press **HELP** to view the contextual help.
- Press **Continue** or **ESC** to skip the message and enter Titrator main screen.



- Press **Purge** to begin a purge cycle.



The purging stops automatically after 5 minutes.

To stop purging at any time and return to the main screen press **ESC** or **Stop**.

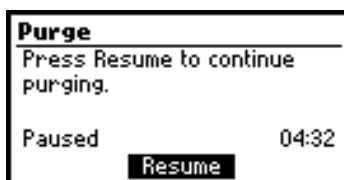
During a purge, the remaining time until the purge process will be completed is shown on the lower right side of the display.

Press **Pause** to interrupt the purge process.

Press **Pause** or **Stop** (by pressing the corresponding function key in the purge screen)

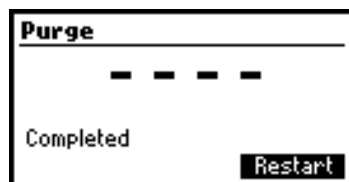
- after the first drops of fresh titrant appear at the dosing tip
- in case of error conditions (empty titrant, bottle, tubes or dosing tip disconnected, pump error)
- if you want to resume at a later time

If **Pause** is pressed the next screen is displayed:



Press **Resume** to continue purging.

After the 5 minutes purging interval has elapsed the “Completed” message is displayed. Another purge period can be initiated by pressing **Restart** or press **ESC** to return to main titrator screen.



## PUMP CALIBRATION PROCEDURE

SETUP alkalinity type and purge unit with titrant before performing the pump calibration.

- Select the corresponding range according to the table below.

| UNIT  | Low Range<br>(50 mL sample) | High Range<br>(50 mL sample) |
|-------|-----------------------------|------------------------------|
| mg/L  | 10.0 to 500.0               | 400 to 4000                  |
| meq/L | 0.2 to 10.0                 | 8 to 80                      |

The pump calibration must be performed each time the alkalinity type, pump tube, titrant bottle or the pH electrode is changed. It is recommended the pump calibration be performed before each set of titrations.

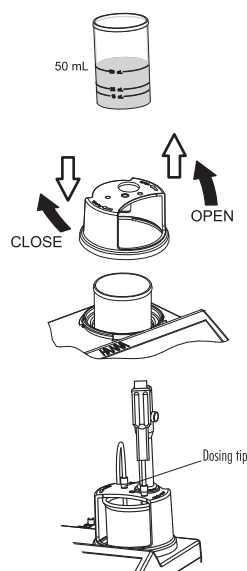
**Verify:** The electrode has been calibrated in 8.30 pH buffer.

- **Sample preparation:** Add a precisely measured amount of **HI 84431-55 Pump Calibration Solution** to a clean beaker as indicated below:

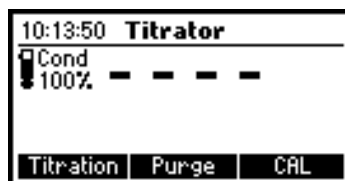
Low Range (Strong LR, Total LR) - 2 ml  
High Range (Strong HR, Total HR) -20 ml

Fill the beaker up to the 50 mL mark with the distilled or deionized water. Place the stir bar into the beaker and then place the beaker into the appropriate place on the instrument top.

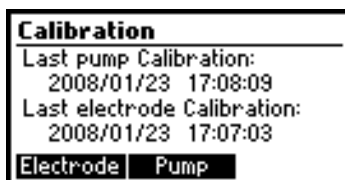
- Place the electrode holder on the top of the beaker and secure it by turning clockwise.
- Immerse the calibrated pH and the temperature electrodes approximately 2 cm (0.8”) into the sample to be tested paying attention not to touch the stir bar.
- Verify if the titrant correspondes to selected titration range.  
For Low Range (Strong LR, Total LR) use the **HI 84431-50**.  
For High Range (Strong HR, Total HR) use the **HI 84431-51**.



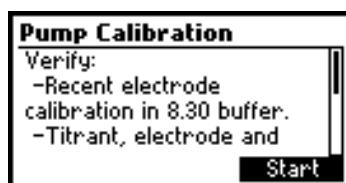
- Insert the dosing tip in the appropriate guide tube holder place and insert it in the solution.
- Note:** The chemical reagents may be hazardous if improperly handled. Read the Material Safety Data Sheets (MSDS) before performing the test.
- From the titrator main screen press **CAL**.



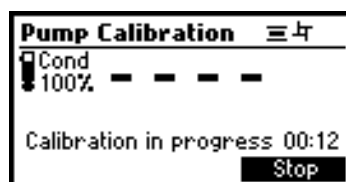
The instrument displays the date and time of the last electrode calibration, and the date and time of the last pump calibration, or calibration expired messages.



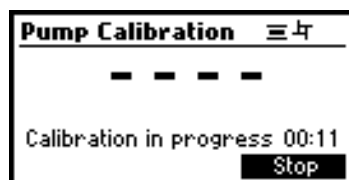
- Press **Pump**.  
The next screen will be displayed.



- Press **Start**.
- After the pump calibration is started, on the upper right side of the display two animations will be shown in order to indicate that the pump and the stirrer are working. On the lower right side of the display is shown the amount of time that has passed since beginning of the calibration.



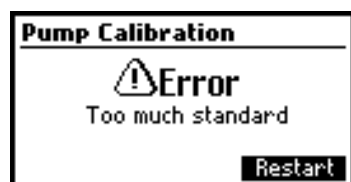
- After the pump calibration is complete a confirmation message is displayed for a few seconds, then the instrument will return to the titrator calibration menu and will display the new time and date for the last pump calibration.



- Notes:**
- The calibration of the pump is dependent on alkalinity range selected during SETUP.
  - If an erroneous situation is encountered during the calibration, an error message is displayed and the calibration can be restarted by pressing **Restart**.



- If the calibration doesn't complete within 6 minutes the error message "**Too much standard**" will be displayed and the calibration can be restarted by pressing **Restart** after a new standard is prepared.



- When pump calibration is complete, carefully unscrew electrode holder with pH electrode, temperature probe and titrant top intact. Hold over rinse beaker and rinse off with distilled or deionized water. Remove beaker and rinse out.

## TITRATION PROCEDURE

**Verify:** The instrument has been calibrated (pH and pump) before performing a lot of titrations. An electrode calibration in at least one point (8.30 pH buffer) is recommended.

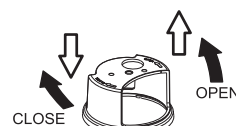
- Refer to Setup Configuration Menu (see the “Setup” section) to set up instrument for your measurement.

- **Sample preparation:** For all measurement samples fill a beaker up to the 50 mL mark with sample. Place the stir bar into the beaker and then place the beaker in the appropriate place on the instrument top.

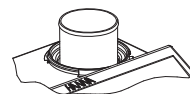


**Note:** Water samples must be collected and stored in capped bottles.

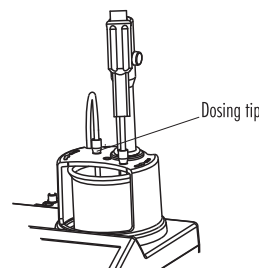
- Position the electrode holder on the top of the beaker and secure it by turning clockwise.



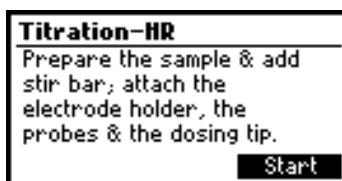
- Immerse the pH and the temperature electrodes approximately 2 cm (0.8”) into the sample to be tested paying attention not to touch the stir bar. Use **O-Rings** provided to secure the pH electrode in holder.



- Insert the dosing tip in the appropriate holder place and insert it in the sample.

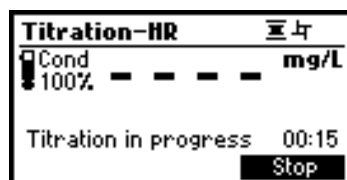


- From the titrator main screen press **Titration**. To enter titrator main screen from pH meter mode press **Titrator** and then **Continue**.

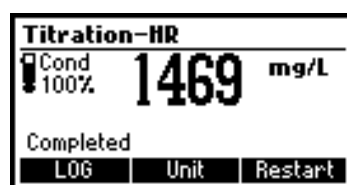


- Press **Start** to begin the titration process.

- After the titration is started on the upper right side of the display two animations will be shown in order to indicate that the pump and the stirrer are running. On the lower right side of the display is shown the period of time since the titration has been started.



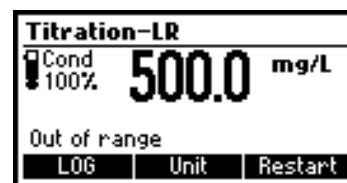
- After the titration is complete, the concentration value is displayed in the selected unit.



- Press **Unit** to change the display unit.
- Press **LOG** to record the concentration value into the instrument's memory.  
A message will be displayed for a few seconds indicating the amount of the free log space. 50 log samples can be recorded in the instrument's memory. When the titrator free log space is under 12% the message will be shown permanently.



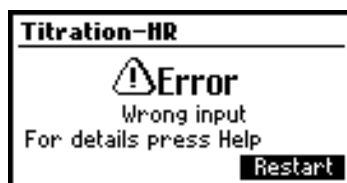
- If the concentration is out of limits an exceeded range limit message will be displayed blinking and the message "Out of range" will be shown. Another titration can be initiated by pressing **Restart**.



- Remove electrode holder. Rinse the electrode into waste container.

- Prepare a fresh sample and place on titrator. Place the temperature probe and the electrode in appropriate guides.
- Immerse the titrant tip and use care not to dislodge titrant from dispensing tip.

**Note:** If the end-point is not reached or it is not recognized or the input reading is out of range, an error message will be displayed. The titration can be restarted after a new sample is prepared by pressing **Restart**.

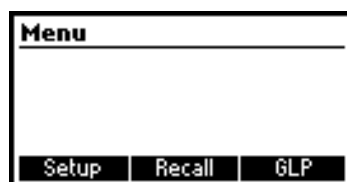


#### TIPS FOR AN ACCURATE MEASUREMENT

- Calibrate the instrument in 8.30 pH buffer solution at least once a day, before you start to perform measurements.
- Purge the peristaltic pump to have the fresh titrant when starting a new calibration.
- Calibrate the peristaltic pump daily before performing a set of analyses.
- Clean the electrode in order to remove the possible coating from bulb.
- Precision of the measurement can be improved by using volumetric pipettes for standard and sample additions.

#### VIEW/DELETE LOGGED SAMPLES

Press **MENU** key while in Titrator main screen.



Press **Recall** to access the titrator logged data.

The instrument will display a list of all the titration records stored in the titration log.


Use the **ARROW** keys to scroll the stored records list.

If the saved concentration was out of range the "!" symbol is displayed in front of the reading.

|                            | Conc  | Unit | Titration |
|----------------------------|-------|------|-----------|
| 1                          | 1729  | mg/L | Total HR  |
| 2                          | 945   | mg/L | Total HR  |
| 3                          | 154.1 | mg/L | Strong LR |
| 4                          | 186.6 | mg/L | Total LR  |
| Delete All   Delete   More |       |      |           |

Press **Delete** to enter delete record screen.  
 Press **Delete All** to enter delete all records screen.  
 Press **More** to view additional information of the measurement.

**Record number: 1**  
 Date: 2008/02/12  
 Time: 16:49:30  
 Concentration: 1347mg/L  
 Alkalinity type: Total HR  
 Unit

Press **Unit** to convert the result between meq/L and mg/L.  
 Press **ESC** to return to the previous screen.  
 Use the **ARROW** keys when  is displayed to scroll between the log records.

**Delete Record?**

|   |           |           |
|---|-----------|-----------|
| 4 | 597 mg/L  | Total HR  |
| 5 | 650 mg/L  | Total HR  |
| 6 | 22.0 mg/L | Strong LR |
| 7 | 84.2 mg/L | Total LR  |

Confirm

If **Delete** was pressed the instrument will ask for confirmation.  
 Use the **ARROW** keys to focus on the record to be deleted.  
 Press **Confirm** to delete the record or **ESC** to return to the previous screen.  
 Deleting a record will renumber the list of records.  
 If **Delete All** was pressed the instrument will ask for confirmation.

**Delete all records?**

|   |           |           |
|---|-----------|-----------|
| 4 | 597 mg/L  | Total HR  |
| 5 | 650 mg/L  | Total HR  |
| 6 | 22.0 mg/L | Strong LR |
| 7 | 84.2 mg/L | Total LR  |

Confirm

Press **Confirm** to delete all the records or **ESC** to return to the previous screen.  
 If the titrator log is empty the message "No Records!" will be displayed.

**Titration results**

**No Records!**



## TITRATOR GLP INFORMATION

Press **MENU** while in **Titration** mode and then **GLP**.



From this screen it is possible to select between viewing the **electrode GLP** or the **pump GLP**.

Press **GLP elec.** to view the **electrode's last calibration parameters and date**.

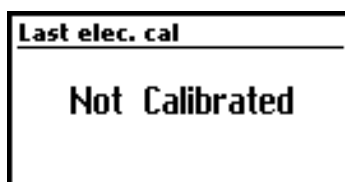
Press **GLP pump** to view the **pump's last calibration time and date**.

If **GLP elec.** is pressed one of the next screens will be displayed.

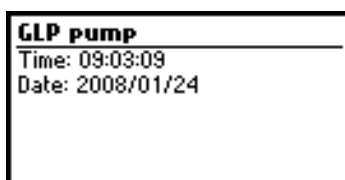
| <b>Last elec. cal</b> | <b>Buffer</b> |
|-----------------------|---------------|
| Date: 2008/02/12      | 8.30          |
| Time: 16:59:08        | 10.01         |
| Cal Expire: 1 day     | 4.01          |
| Offset: 3.0mV         |               |
| Slope: 102.6%         |               |

**GLP** contains a set of information regarding electrode calibration. The following items are included in electrode GLP: the time and date of the last calibration, offset, slope, calibration timeout and the calibration buffers. The buffers displayed in video inverse mode are from the previous calibration.

If a calibration hasn't been performed the message "**Not Calibrated**" will be displayed.

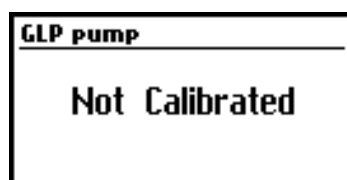


If **GLP pump** is pressed, one of the next screens is displayed.



The pump **GLP** displays the Time and Date of the last pump calibration.

If a calibration hasn't been performed the message "**Not Calibrated**" will be displayed.



## pH MEASUREMENT

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The **HI 84431** may be used as a pH meter for direct measurements.

Verify that the instrument has been calibrated before taking pH measurements. Set the instrument to **pH meter**. At power up the instrument enters **pH meter** mode. From titrator mode press **ESC** until pH units are displayed.

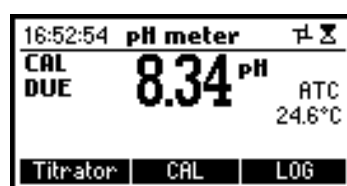
If an electrode calibration hasn't been performed, or the number of days exceeds calibration timeout value set, the displayed message "**CAL DUE**" will blink on the left side of the display (see **Calibration timeout** option in **Setup** for details).

Place pH electrode into electrode holder and connect it to the instrument.

Rinse the pH tip with distilled or deionized water. Immerse the pH (bottom 2 cm / 0.8") in the sample and stir gently for a few seconds.

For a faster response and to avoid cross-contamination of the samples, rinse the electrode tip with a few drops of the solution to be tested, before taking measurements.

If **CAL DUE** is displayed perform an electrode calibration.



Press **MENU** to access the instrument's menu.

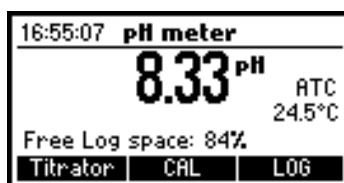
Press **HELP** to view the contextual help, every time you need supplementary information. The help is customized for every situation that can appear during instrument usage.

Press **STIR** to start/stop the stirrer.


Press **Titrator** to enter titrator mode.

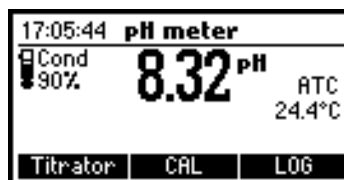
Press **CAL** to access the calibration menu.

Press **LOG** to memorize the current reading. A message indicating the free log space will be displayed for a few seconds.




In order to take pH measurements follow the next steps:

- Submerge the pH bulb 2 cm (0,8") and the temperature probe into the sample to be tested and stir gently. Allow time for the electrode to stabilize. When the reading becomes stable the  (unstable measurement) symbol will disappear.

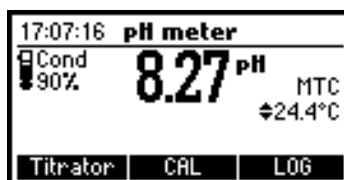


- If the pH readings are less than -2.00 or greater than 16.00 pH the closest full-scale value (-2.00 pH or 16.00 pH) will be displayed blinking.

If measurements are taken successively in different samples, it is recommended to rinse the electrodes thoroughly with deionized water or distilled water and then with some of the next sample to prevent cross-contamination.

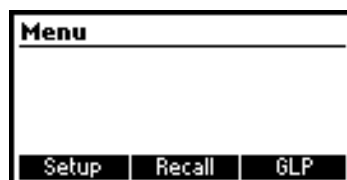
pH measurements are affected by temperature. In order to have accurate pH measurements, the temperature effect must be compensated for. To use the Automatic Temperature Compensation (ATC) feature, connect and submerge the **HI 7662-M** temperature probe into the sample in the dedicated guide tube and wait for a few seconds. The "ATC" message will be shown on the display. Automatic Temperature Compensation will provide pH corrected values at the temperature of measurements. If Manual Temperature Compensation (MTC) is desired, the temperature probe must be disconnected from the instrument. The default temperature of 25 °C (77 °F) or the last temperature reading will be displayed preceded by the symbol  and the "MTC" message.

The manually set temperature can now be adjusted with the **ARROW** keys (from -20.0 to 120.0 °C).



## VIEW OR DELETE PREVIOUSLY LOGGED RECORDS

Press **MENU** key while in pH meter screen.



Press **Recall** to access the pH recall.

A list of records is stored in the pH log.

|                            | pH   | Date       |
|----------------------------|------|------------|
| 5                          | 8.14 | 2008/01/24 |
| 6                          | 8.15 | 2008/01/24 |
| 7                          | 8.19 | 2008/01/24 |
| 8                          | 8.25 | 2008/01/24 |
| Delete All   Delete   More |      |            |

Use the **ARROW** keys to scroll the list of records.

Press **More** to see detailed information about the highlighted record.

Press **Delete** to enter record deleting mode.

Press **Delete All** to enter all records deleting mode.

If **More** is pressed a complete set of data is displayed.

|                         |          |
|-------------------------|----------|
| <b>Record number: 6</b> |          |
| 2008/01/24              | 09:15:45 |
| 8.15pH                  | 21.3°C   |
| Offset: 4.7mV           |          |
| Slope: 102.7%           |          |

Use **ARROW** keys when  is displayed to scroll between the records.

If **Delete** was pressed the instrument will ask for confirmation.

|                       |      |            |
|-----------------------|------|------------|
| <b>Delete Record?</b> |      |            |
| 5                     | 9.61 | 2008/02/22 |
| 6                     | 8.47 | 2008/02/22 |
| 7                     | 7.78 | 2008/02/22 |
| 8                     | 8.96 | 2008/02/22 |
| Confirm               |      |            |

Use the **ARROW** keys to focus on the record to be deleted.

Press **Confirm** to delete the record or **ESC** to return to the previous screen without deleting.

Deleting a record will renumber the list of records.

If **Delete All** was pressed the instrument will ask for confirmation.

| Delete all records? |      |            |
|---------------------|------|------------|
| 5                   | 9.61 | 2008/02/22 |
| 6                   | 8.47 | 2008/02/22 |
| 7                   | 7.78 | 2008/02/22 |
| 8                   | 8.96 | 2008/02/22 |
| Confirm             |      |            |

Press **Confirm** to delete all records or **ESC** to return to the previous screen without deleting.

If the pH log is empty the message "No Records!" will be displayed.

| pH log on demand |  |
|------------------|--|
| No Records!      |  |

### pH METER GLP INFORMATION

The pH meter GLP information references the last pH calibration data.

To view this information press **MENU** key while in pH meter mode then **GLP**.

A set of information regarding electrode calibration is displayed.

| Last elec. cal            | Buffer |
|---------------------------|--------|
| Date: 2008/02/12          | 8.30   |
| Time: 13:54:37            | 10.01  |
| Cal Expire: Disabled      | 4.01   |
| Offset: -0.4mV            |        |
| Slope: 100.0%             |        |
| Electrode condition: 100% |        |

The following items are included in electrode GLP: the time and date of the last calibration, offset, slope, electrode condition, calibration timeout and the calibration buffers. The buffers displayed in video inverse mode are from the previous calibration.

If a calibration hasn't been performed the message "Not Calibrated" will be displayed.

| Last elec. cal |
|----------------|
| Not Calibrated |

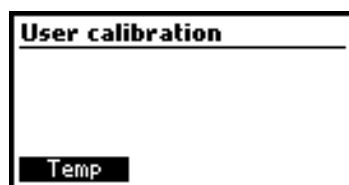
## TEMPERATURE CALIBRATION PROCEDURE (for technical personnel only)

All the instruments are factory calibrated for temperature.

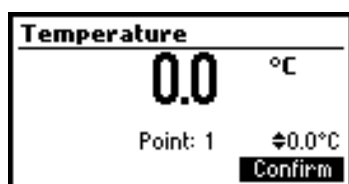
HANNA's temperature probes are interchangeable and no temperature calibration is needed when they are replaced.

If the temperature measurements are inaccurate, temperature recalibration should be performed. For an accurate recalibration, contact your dealer or the nearest HANNA Customer Service Center, or follow the instructions below.

- Prepare a vessel containing ice and water and another one containing hot water (at a temperature of around 50 °C). Place insulation material around the vessels to minimize temperature changes.
- Use a calibrated thermometer with a resolution of 0.1 °C as a reference.
- To enter user calibration screen press and hold down the **ARROW** keys simultaneously, then power on the instrument. After a few seconds the **User calibration** screen is displayed.

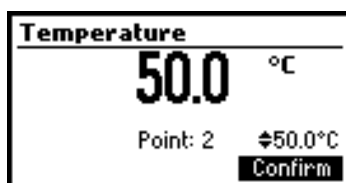


- Press **Temp** function key to enter temperature calibration.
- Immerse the temperature probe in the vessel with ice and water as near as possible to the reference thermometer. Allow a few seconds for the probe to stabilize.
- Use the **ARROW** keys to set the calibration point value to that of the ice and water measured by the reference thermometer.
- The **⚡** (unstable measurement) symbol will be shown on the display until the reading becomes stable.
- When the reading is stable and close to the selected calibration point, the **⚡** (unstable measurement) symbol will disappear and the **Confirm** key will become active.

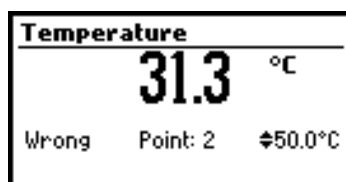


- Press **Confirm** to confirm the calibration point.
- The meter will be automatically move to the second calibration point, and will display 50 °C for the buffer value.

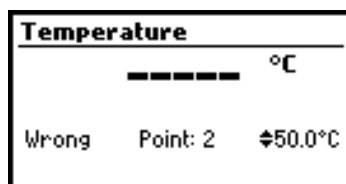
- Immerse the temperature probe in the second vessel as near as possible to the reference thermometer. Allow a few seconds for the probe to stabilize.
- Use the **ARROW** keys to set the calibration point value to that of the hot water, measured by the reference thermometer.
- The **Σ** (unstable measurement) symbol will be shown on the display until the reading becomes stable.
- When the reading is stable and close to the selected calibration point, the **Σ** (unstable measurement) symbol will disappear and the **Confirm** key will become active.
- Press **Confirm** to confirm the calibration point. The instrument will return to the pH meter/ titrator main screen.



**Note:** If the reading is not close to the selected calibration point, the "Wrong" message will be displayed. Change the temperature probe and restart the calibration.



If the temperature probe is disconnected or the measured temperature is out of the - 20 to 120 °C range the instrument will display "----". The calibration point value can be changed using the **ARROW** keys.



## TROUBLESHOOTING GUIDE

| SYMPTOMS  | PROBLEM  | SOLUTION   |
|---|--|--|
| Slow response/excessive drift.  | Dirty pH electrode.  | Soak the electrode tip <b>HI 7061</b> cleaning solution for 30 minutes. Refill with fill solution.   |
| Reading fluctuates up and down (noise).   | Clogged/dirty junction. Low electrolyte level (refillable pH electrodes only). Cable connection. | Clean the electrodes. Refill with fresh fill solution. Check cable connection to meter and verify protective cap is removed.   |
| While in pH reading mode, -2.00 or 16.00 pH is displayed blinking.  | Reading out of range.  | Check cable connection to meter and verify protective cap is removed. Check the quality of the sample. Clean the electrodes. Refill with fresh fill solution.  |
| The meter does not accept the pH buffer solution for calibration.   | Broken pH electrode.   | Replace the electrode or contact the vendor.   |
| The pump calibration can't be performed   | Wrong pump calibration solution. Broken pump tubing. Broken electrodes.                          | Verify tubing is intact and and titrant passes when purged. Verify the electrode has been calibrated recently in fresh pH buffers. Check the pump calibration solution. Prepare another standard, purge to have fresh titrant and restart the calibration. |
| The temperature probe is connected, but the meter displays "MTC".   | Broken temperature probe.  | Replace temperature probe.   |
| After a titration in <b>Low Range</b> the instrument displays 500 mg/L or 10 meq/L (according with the selected unit) blinking. | Meter setup wrong for sample. Concentration out of range.  | Change alkalinity type under <b>SETUP</b> menu to <b>High Range</b> and change associated titrant. Prime and recalibrate the instrument (pump).  |
| After a titration in <b>High Range</b> the instrument displays 400 mg/L or 8 meq/L (according with the selected unit) blinking. | Meter configured wrong for sample analyzed. Concentration out of range.                          | Change alkalinity type under <b>SETUP</b> menu to <b>Low Range</b> and change associated titrant. Prime and recalibrate the instrument (pump).   |



| SYMPTOMS   | PROBLEM   | SOLUTION  |
|--|---|---|
| After a titration in <b>High Range</b> the instrument displays 4000 mg/L or 800 meq (according with the selected unit) blinking. | Broken electrodes. Instrument not calibrated. Wrong sample. Concentration out of range. | Check/clean the electrodes. Recalibrate the instrument (pump and pH). Use care during sample preparation. |
| At startup the meter displays the HANNA logo permanently.  | One of the keys is blocked.   | Check the keyboard or contact the vendor.   |
| "Error xx" message is displayed.   | Internal error.   | Power off the meter and then power it on again. If the error persists, contact the vendor.                |

## ELECTRODE CONDITIONING AND MAINTENANCE

### STORAGE PROCEDURE

To assure a quick response time, the glass bulb should be kept moist and not allowed to dry out. Replace the solution in the protective cap with a few drops of **HI 70300** or **HI 80300** Storage Solution. Follow the Preparation Procedure section before taking measurements.

**Note:** NEVER STORE THE pH ELECTRODE IN DISTILLED OR DEIONIZED WATER.

### PERIODIC MAINTENANCE

Inspect the electrodes and the cables. The cable used for connection to the instrument must be intact. There should be no cracks on the electrode stem or bulb. Connectors must be perfectly clean and dry. If any scratches or cracks are present, replace the electrode. Rinse off any salt deposits with water.

### pH CLEANING PROCEDURE

- *General* Soak in Hanna **HI 7061** or **HI 8061** General Cleaning Solution for approximately ½ hour.

**IMPORTANT:** After performing any of the cleaning procedures, rinse the electrode thoroughly with distilled or deionized water and soak the electrode in **HI 70300** or **HI 80300** Storage Solution for at least 1 hour before use. Recalibrate electrode before using.

## ACCESSORIES

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### REAGENTS

|             |  |
|-------------|--|
| HI 84431-50 | Titration solution for low range (100mL)                   |
| HI 84431-51 | Titration solution for high range (100mL)                  |
| HI 84431-55 | Pump calibration solution (100mL)                          |
| HI 84431-70 | Reagents kit for low and high range (about 150 titrations) |
| HI 84431-71 | Reagents kit for low range (about 150 titrations)          |
| HI 84431-72 | Reagents kit for high range (about 150 titrations)         |

### pH CALIBRATION SOLUTIONS

|             |                                      |
|-------------|--------------------------------------|
| HI 7004M    | Buffer solution pH 4.01 (230mL)      |
| HI 70083M   | Buffer solution pH 8.30 (230mL)      |
| HI 7010M    | Buffer solution pH 10.01 (230mL)     |
| HI 7004M-6  | Buffer solution pH 4.01 (6 x 230mL)  |
| HI 70083M-6 | Buffer solution pH 8.30 (6 x 230mL)  |
| HI 7010M-6  | Buffer solution pH 10.01 (6 x 230mL) |

### ELECTRODES

|           |                   |
|-----------|-------------------|
| HI 1131B  | pH Electrode      |
| HI 7662-M | Temperature probe |

### ELECTRODE FILL SOLUTION

|         |   |
|---------|---|
| HI 7071 | Filling solution (4x30 mL) for HI 1131B |
|---------|---|

### ELECTRODE STORAGE SOLUTION

|           |                                 |
|-----------|---------------------------------|
| HI 70300M | Storage Solution, 230 mL bottle |
|-----------|---------------------------------|

### CLEANING SOLUTION

|          |  |
|----------|--|
| HI 7061M | Electrode Cleaning Solution, 230 mL bottle |
|----------|--|

### OTHER ACCESSORIES

|           |  |
|-----------|--|
| HI 70483M | Tube set with cap and tip for titrant bottle |
| HI 731319 | Stir bar 25 x 7 mm (10 pcs)                  |
| HI 731342 | 2000 $\mu$ L fixed volume pipette            |
| HI 731352 | Tip for 2000 $\mu$ L fixed pipette (4 pcs)   |
| HI 731341 | 1000 $\mu$ L fixed volume pipette            |
| HI 731351 | Tip for 1000 $\mu$ L fixed pipette (25 pcs)  |

## WARRANTY

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**HI 84431** is warranted for two years against defects in workmanship and materials when used for its intended purpose and maintained according to the instructions.

This warranty is limited to repair or replacement free of charge.

Damage due to accident, misuse, tampering or lack of prescribed maintenance is not covered.

If service is required, contact your dealer. If under warranty, report the model number, date of purchase, serial number and the nature of the failure. If the repair is not covered by the warranty, you will be notified of the charges incurred.

If the instrument is to be returned to Hanna Instruments, first obtain a Returned Goods Authorization Number from the Customer Service Department and then send it with shipment costs prepaid. When shipping any instrument, make sure it is properly packaged for complete protection.

To validate your warranty, fill out and return the enclosed warranty card within 14 days from the date of purchase.

## RECOMMENDATION FOR USERS

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Before using this product, make sure that it is entirely suitable for your specific application and for the environment in which it is used.

Operation of this instrument may cause unacceptable interferences to other electronic equipments, this requiring the operator to take all necessary steps to correct interferences.

Any variation introduced by the user to the supplied equipment may degrade the instrument EMC performance.

To avoid damages or burns, do not put the instrument in microwave ovens. For yours and the instrument safety do not use or store the instrument in hazardous environments.

|  |
|--|
| Hanna Instruments reserves the right to modify the design, construction and appearance of its products without advance notice. |
|--|



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